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Geographic distribution of cod eggs and larvae in the southern Gulf of St. Lawrence based on the mackerel egg survey, 1982-1991

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Abstract

Exploration for oil and gas has been proposed for the southern Gulf of St. Lawrence between Prince Edward Island and Cape Breton Island (in Canadian Statistical Unit 4Tg). This paper provides background information on the geographic distribution of eggs and larvae of Atlantic cod (*Gadus morhua*) in the southern Gulf of St. Lawrence. Distributions are based on catches in the mackerel egg surveys conducted between 1982 and 1991. Cod eggs were broadly distributed over the Magdalen Shallows. Egg concentrations tended to be highest east of Miscou over the western region of the Shallows. Cod larvae tended to be distributed to the east of the areas of highest egg concentrations. In the early to mid 1980s, larvae were broadly distributed over the Magdalen Shallows, but densities tended to be highest in eastern and central regions of the Shallows. Larval distribution appeared to be more restricted in the late 1980s and early 1990s.

Résumé

On envisage de faire de l'exploration gazière et pétrolière dans le sud du golfe du Saint-Laurent, entre l'Île-du-Prince-Édouard et l'île du Cap-Breton (dans l'unité statistique canadienne 4Tg). Le présent document donne des renseignements généraux sur la répartition géographique des oeufs et des larves de morue (*Gadus morhua*) dans le sud du golfe du Saint-Laurent. Les répartitions établies reposent sur les prises réalisées dans le cadre des relevés des œufs de maquereau effectués entre 1982 et 1991. Des œufs de morue ont été recueillis un peu partout sur le Plateau madelinien, bien qu'ils aient eu tendance à être présents en plus grandes concentrations à l'est de Miscou, dans le secteur ouest du Plateau. Les larves de morue étaient surtout réparties à l'est des secteurs où les concentrations d'œufs étaient les plus élevées. Du début au milieu des années 1980, les larves étaient présentes un peu partout sur ces hauts-fonds, mais les densités tendaient à être le plus élevées dans les quadrants est et centre. La répartition des larves semblait plus limitée à la fin des années 1980 et au début des années 1990.

Introduction

Exploration for oil and gas has been proposed for the southern Gulf of St. Lawrence between Prince Edward Island and Cape Breton Island (in Canadian Statistical Unit 4Tg). This paper provides background information on the geographic distribution of eggs and larvae of Atlantic cod (*Gadus morhua*) in the southern Gulf of St. Lawrence to aid in the determination of potential impacts of the proposed exploration. Distributions are based on catches in the mackerel egg surveys conducted between 1982 and 1991. A more detailed description of these results is given by Castonguay et al. (1998).

Material and Methods

The mackerel egg survey consists of two passes (in most years) of a grid of 65 stations spaced 20 nautical miles apart (Fig. 1). Samples are collected during both day and night. At each station, a double-oblique tow is made with a 61-cm bongo frame fitted with 333 μ m-mesh nets. Tows are conducted from the surface to a depth of 50 m (or to 5 m off the bottom in shallow water). Further details of sampling procedures are given by Castonguay et al. (1998).

Cod egg and larval densities were determined as described by Castonguay et al. (1998). Early stages of cod eggs are indistinguishable from haddock and witch flounder and are usually identified collectively as CHW eggs. Because haddock are rare in the southern Gulf and relatively few witch flounder larvae are caught in the survey, we assumed that CHW eggs were cod.

We summarized egg distributions for each pass by combining data from all years, except those with a high proportion of missing data. No or very few cod eggs were identified in several years, and these years were also omitted from the analyses reported here. Omitted years are listed in the caption to Fig. 2.

We also summarized larval distributions for each pass, again omitting years with a high proportion of missing data (1987 pass 2; 1989-1990 pass 1). Distributions appeared to differ between the early and late years in the time series, so larval densities were mapped separately for these two periods (1982-1987, 1988-1991).

Distributions were mapped using the ACON software package. Interpolation was based on Delaunay triangles. Contour intervals were the 10th, 30th, 50th, 70th, and 90th percentiles of the non-zero catches.

Results and Discussion

Average egg distributions were similar between the first and second passes of the survey (Fig. 2). Cod eggs were broadly distributed over the Magdalen Shallows. Egg concentrations tended to be highest east of Miscou over the western region of the Shallows.

Cod larvae tended to be distributed to the east of the areas of highest egg concentrations (Fig. 3). This is consistent with the pattern of currents over the Magdalen Shallows. In the early to mid 1980s, larvae were broadly distributed over the Magdalen Shallows, but densities tended to be higher in eastern and central regions of the Shallows than in western regions. Larval distribution appeared to be more restricted in the late 1980s and early 1990s. In this latter period, larval density tended to be highest between PEI and the Magdalen Islands and to the east of the Magdalen Islands, and low elsewhere in the southern Gulf.

References

- Castonguay, M., Y. de Lafontaine, and J. A. Runge. 1998. Annual and spatial variability in zooplankton biomass and species composition, and in eggs and larvae of mackerel and cod in the southern Gulf of St. Lawrence between 1982 and 1991. *Can. Data Rep. Fish. Aquat. Sci.* 1035: v + 86 p.

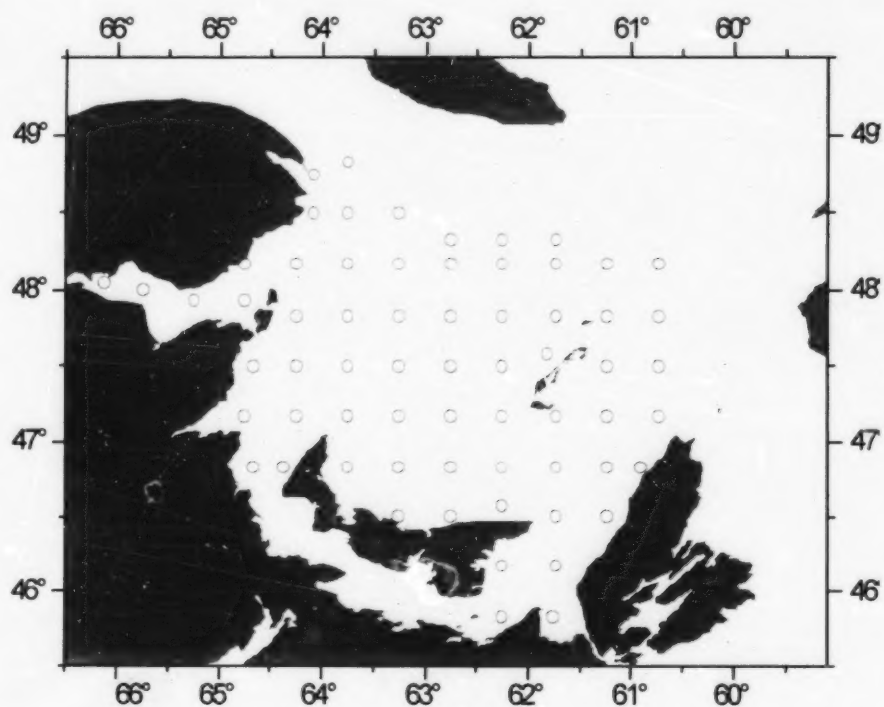


Figure 1. Sampling grid for the mackerel egg survey of the southern Gulf of St. Lawrence.

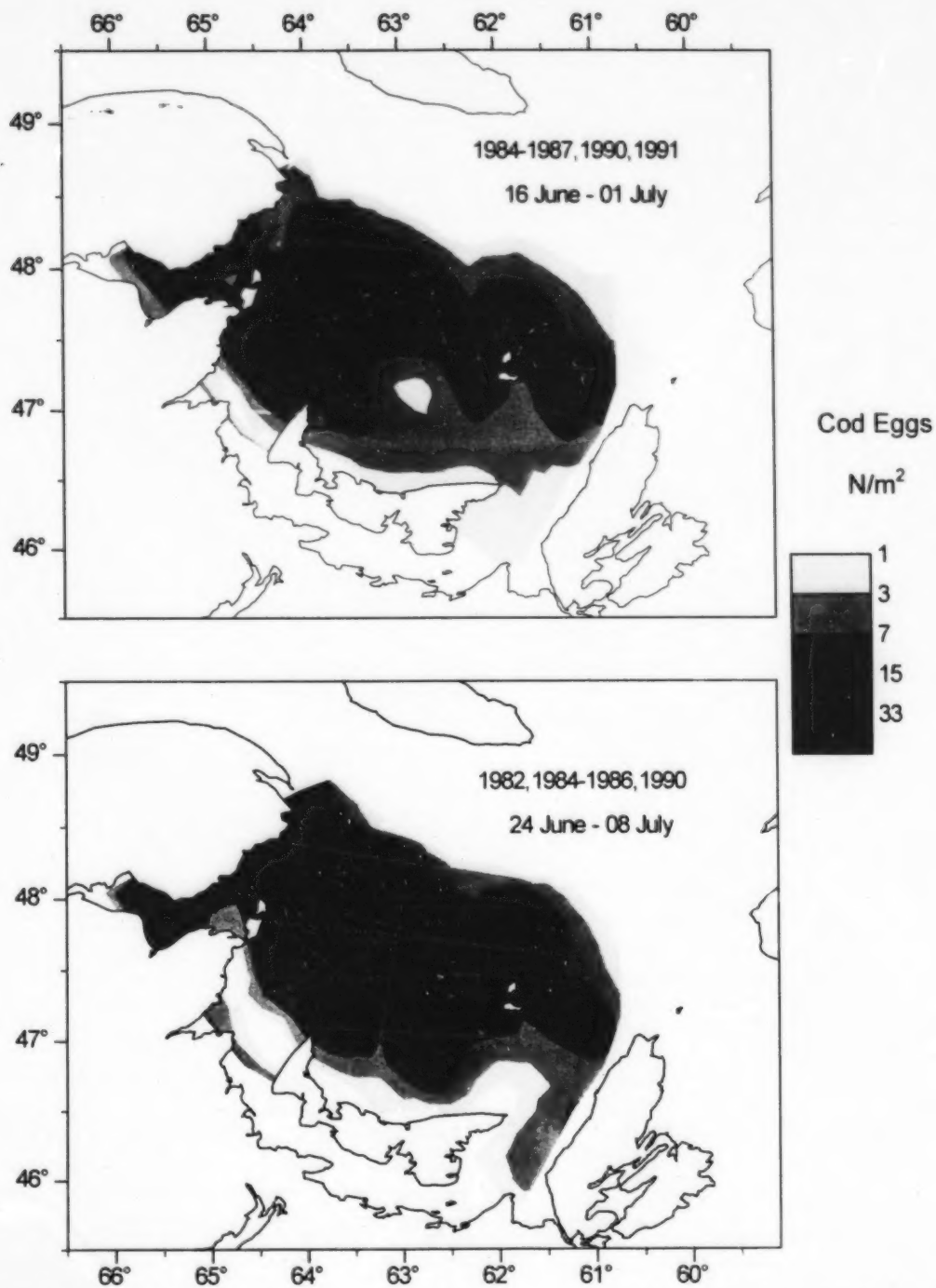


Figure 2. Distribution of cod eggs in pass 1 (upper panel) and pass 2 (lower panel) of the mackerel egg survey of the southern Gulf of St. Lawrence, 1982-1991. Surveys with a high proportion of missing data or with very few cod eggs recorded omitted (pass 1: 1982, 1983, 1988, 1989; pass 2: 1987-1989).

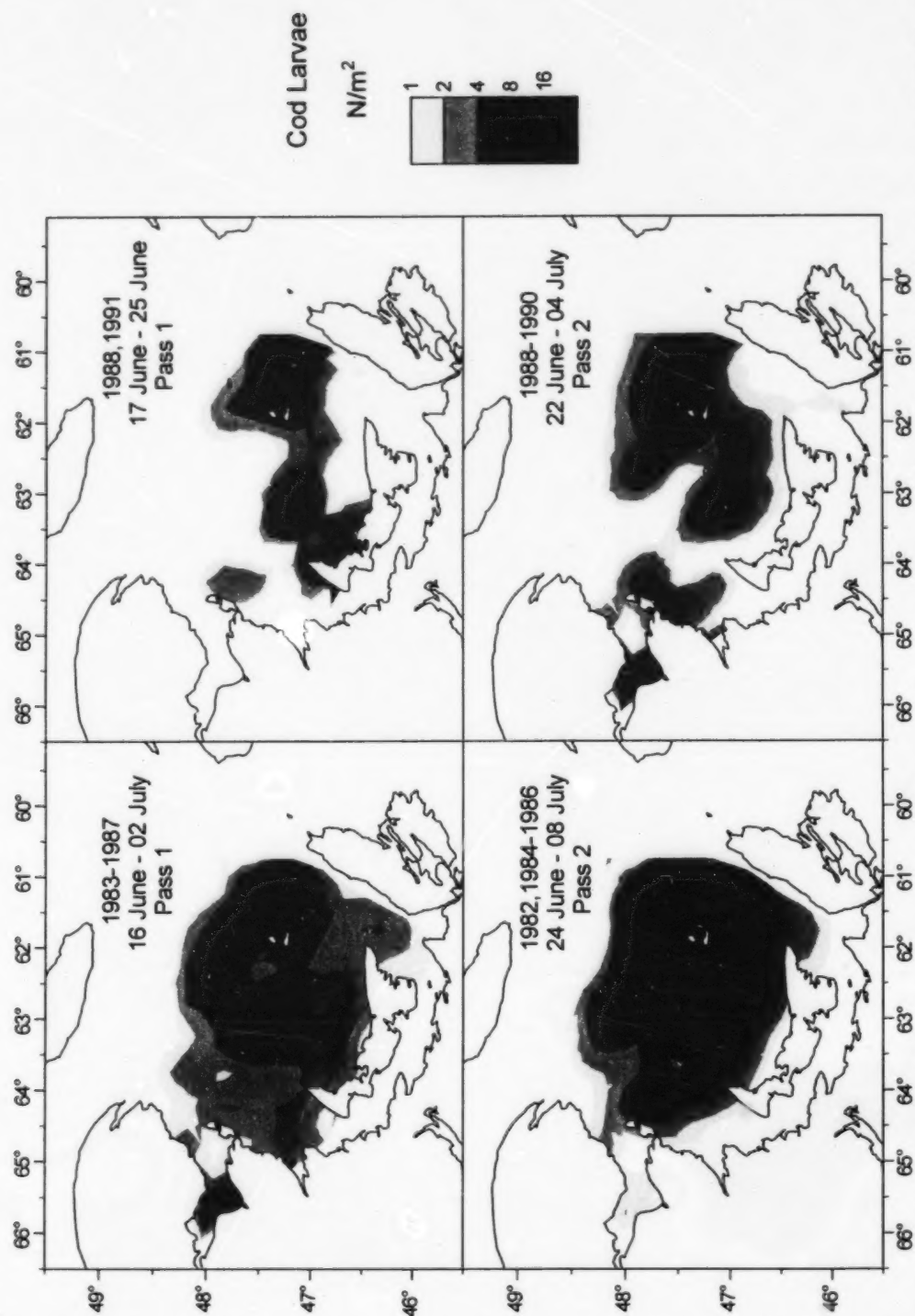


Figure 3. Distribution of cod larvae in passes 1 and 2 of the mackerel egg survey in the southern Gulf of St. Lawrence, 1982-1991. Surveys with a high proportion of missing tows omitted (1987 pass 2; 1989-1990 pass 1).